

Rapid Watershed Assessment for
The Big Sandy River Basin
In West Virginia



**Prepared by United States Department of Agriculture
Natural Resources Conservation Service**

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Common Abbreviations

ACT – American College Testing

ARC – Appalachian Regional Commission

FEMA – Federal Emergency Management Agency

GIS – Geographic Information System

HUC – Hydrologic Unit Code

NRCS – Natural Resources Conservation Service

RC&D – Resource and Conservation Development

USACE – United States Army Corp of Engineers

Scope & Authority

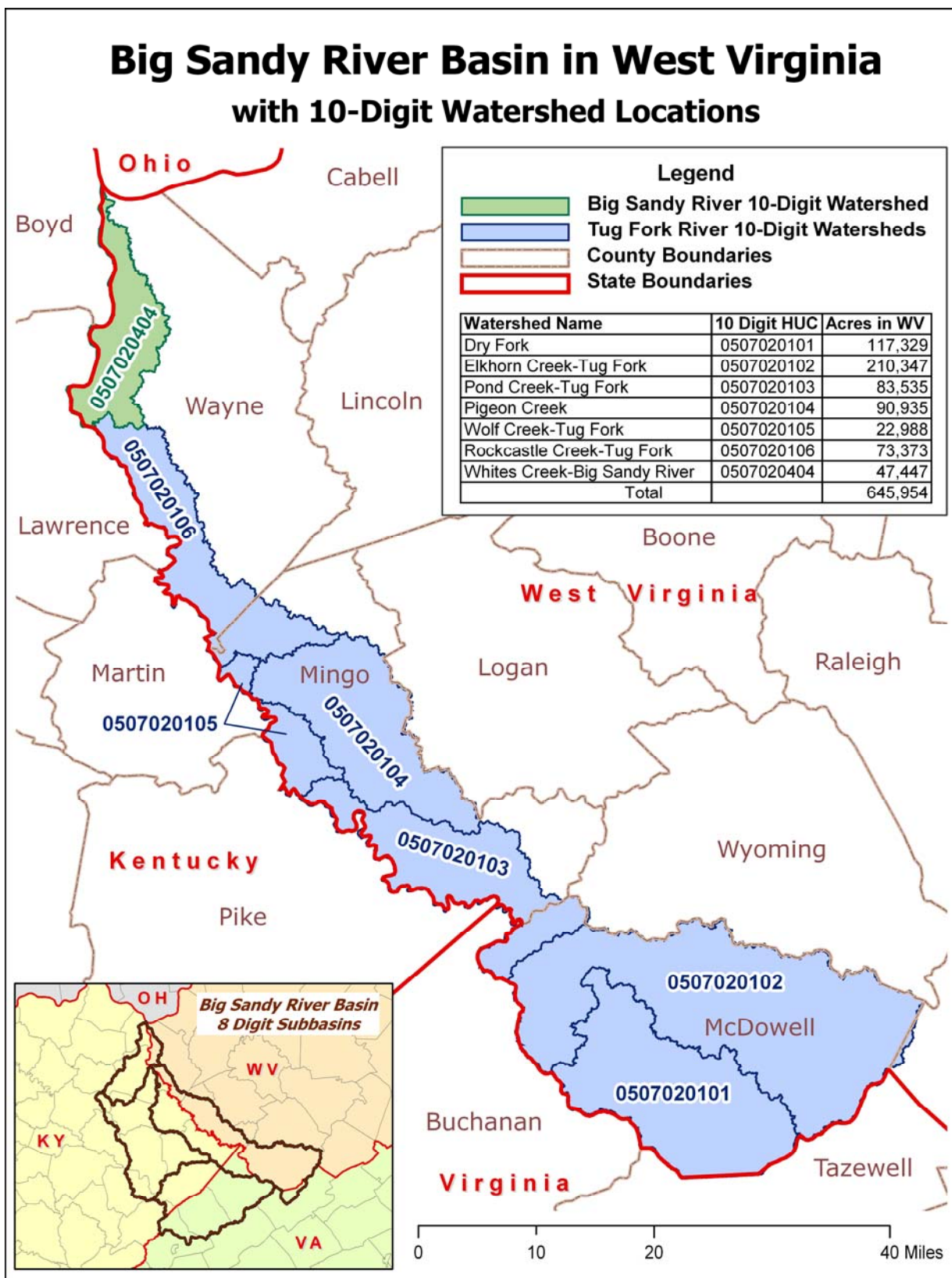
The purpose of this report is to document broad areas of natural resource concerns and to apply geographic information system (GIS) techniques to identify opportunities where NRCS may be able to provide assistance, either through our existing programs, new initiatives, or by assisting others who are working in the Big Sandy River Basin. Funding for this assessment was provided under the authority of the Conservation Technical Assistance Program, Soil Conservation and Domestic Allotment Act of 1935, as amended, Public Law 74-46, 16 U.S.C. (590a-f and 590q), 7 CFR Part 610 (CFDA 10.902).

Assessment Objectives

This assessment will describe the natural resources of the watershed, relying on existing data and available GIS mapping information. Data gaps will be noted in the assessment. Local guidance and input will be gleaned from existing watershed group reports, government planning documents, conservation districts, and NRCS field offices. Based on the data collected, priority areas will be identified that offer the best potential for assistance. A primary objective of this assessment is to identify NRCS programs or expertise that addresses the natural resource needs of the basin. In the event that no match exists, environmental needs will require alternative solutions. Finally, this assessment evaluates the usefulness of the rapid watershed assessment approach in a non-agricultural watershed.

Geographic Area of Study

This assessment focuses on the portion of the watershed in McDowell, Mingo and Wayne Counties in WV. The Big Sandy River Basin is located at the intersection of three states, Virginia, Kentucky and West Virginia. Over half of the land area of the basin, or 54%, is in Kentucky, and 23% is in both West Virginia and Virginia. Less than 1% of the watershed drainage is in Mercer County, West Virginia so that area is not analyzed in this assessment. The Big Sandy River Basin in West Virginia is composed of the Tug Fork River and Big Sandy River drainages. All of the Big Sandy River Basin is located within the Appalachian Mountain Range.



Map 1. Big Sandy Geographic Area

Topography, Climate, Agriculture

The Big Sandy River Basin is located within two major land resource areas - the Cumberland Plateau and Mountains and the Central Allegheny Plateau major land resource areas. The watershed is similar in all three counties in terms of physical, demographic, and economic resources. The area is highly dissected, dominated by very steep, rugged side slopes which are broken by strongly sloping to steep ridge tops and very narrow bottoms along streams. The bottomland provides the least challenging building sites and most of the population is crowded into these very narrow areas.

The majority of the basin is made up of sandstone, siltstone and shale, with coal beds. Coal bearing sedimentary rocks, sandstone, siltstone and shale form most of the parent material that weathers into soil. Coal dominates the cultural, economic, and environmental aspects of the watershed.

The dominant soils in hilly to steep areas of the basin are shallow to moderately deep, well drained or somewhat excessively drained, and loamy and formed in sandstone or shale residuum (USDA, 2006). The remaining soils on steep slopes generally are deep or very deep, well drained, loamy and formed in gravelly or stony colluvium derived from sandstone and/or shale. Soils on flood plains are well drained, moderately well drained, or poorly drained. They are deep or very deep, are loamy, and formed in alluvium derived from sandstone and shale. Some soils formed in material derived from surface and deep mines, which is common in this area.

McDowell County is almost entirely drained by the Tug Fork River. A few acres along the Mercer County line are in the Crane Creek Watershed, a tributary to the Bluestone River. In Mingo County, the main drainage is Pigeon Creek, which flows northwest then turns southwest into the Tug Fork River. The Tug Fork separates the states of Kentucky and Virginia, from the state of West Virginia. The Big Sandy River and its tributary, the Tug Fork, drain the western one-third of Wayne County.

Climate information is provided for McDowell County, which is representative of the Big Sandy Watershed. In winter, average temperature is 34 degrees F and cold and snowy at the higher elevations. In the valleys, it is also frequently cold but snow cover does not last long due to intermittent thaws. The average seasonal snowfall is about 19 inches. In summer, the average temperature is 72 degrees. The climate is fairly warm on mountain slopes and very warm to occasionally hot in the valleys.

Rainfall is evenly distributed throughout the year, but it is significantly heavier on the windward, west-facing slopes than in the valleys. The total average annual precipitation is about 41 inches. Thunderstorms occur on about 45 days each year. Heavy rains, which occur at any time of the year, and severe thunderstorms in summer cause flash flooding.

Land use is primarily forestland. In most of the watershed, farming is virtually non-existent due to the steep terrain. However, there is some farming in Wayne County. Agricultural statistics for McDowell County are most representative of agriculture in the

watershed that extends into Mingo County. In McDowell County, there are only 853 acres in farmland and 38 head of livestock of all kinds. Cropland accounts for less than 1% of the farmland. The Mingo County portions of the watershed are equally devoid of agricultural activity.

The farms in the Wayne County portion of the watershed area are similar to the rest of Wayne County. Average farm size is 166 acres. The majority of farming consists of cow/calf operations and the production of pasture and hay. Farms graze an average of 15 cows per farm. Due to the steep slopes, organic matter and fertility is low on pastures.

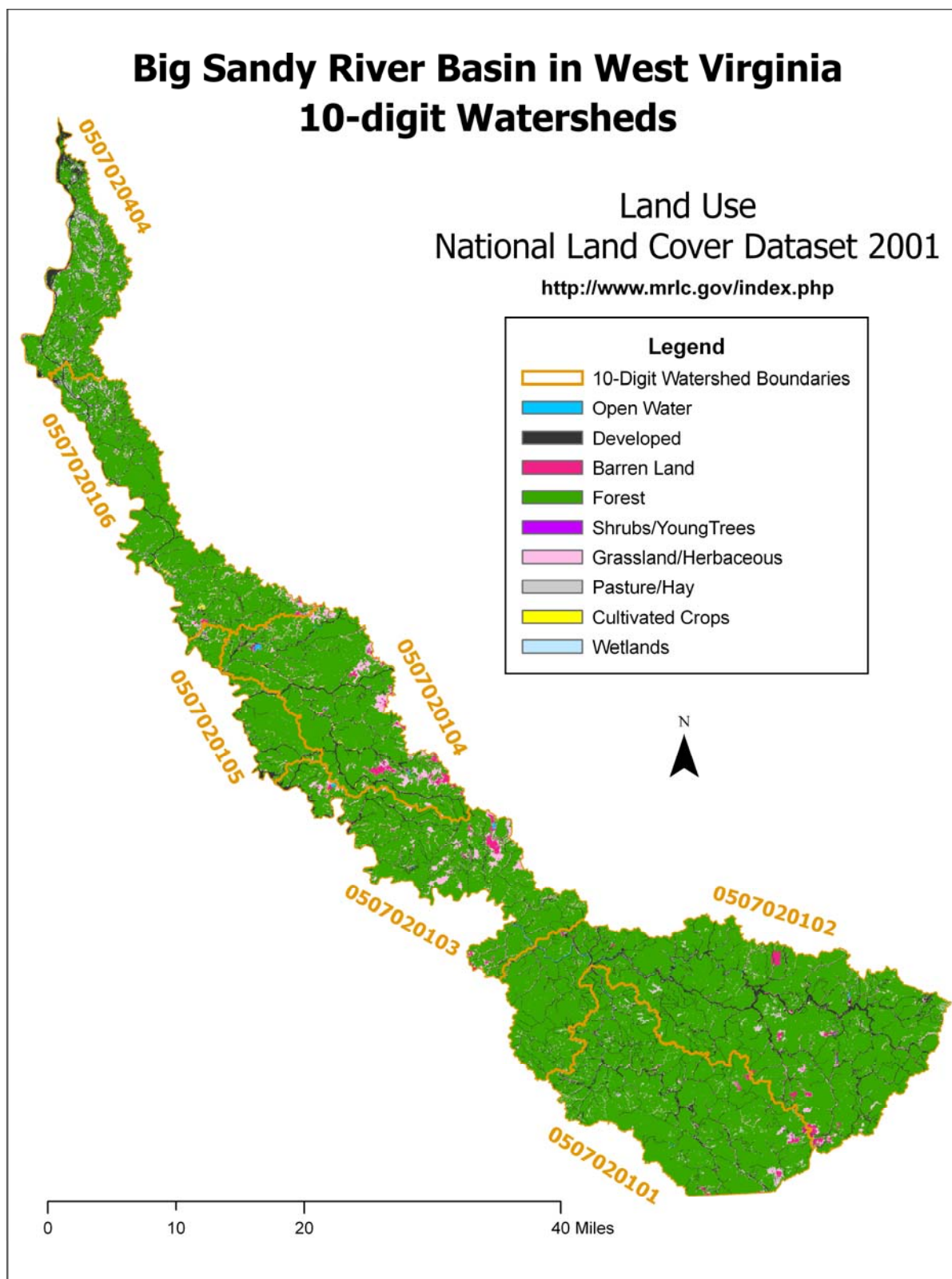


Photo 1. Farm in Wayne County

Most of the land classified as prime farmland in the basin is in Wayne County. Prime farmland, as defined by the USDA, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.

Table 1. Prime Farmland by Hydrologic Unit Code

Tributary Name	HUC	acres	counties	Prime Farmland (acres)	% Prime Farmland
Dry Fork	507020101	117,329	McDowell	11	0.0
Elkhorn Creek-Tug Fork	507020102	210,347	McDowell	336	0.2
Pond Creek-Tug Fork	507020103	83,535	McDowell, Mingo	264	0.3
Pigeon Creek	507020104	90,935	Mingo	334	0.4
Wolf Creek-Tug Fork	507020105	22,988	Mingo	85	0.4
Rockcastle Creek-Tug Fork	507020106	73,373	Mingo, Wayne	3,022	4.1
Whites Creek-Big Sandy River	507020404	47,447	Wayne	3,546	7.5



Map 2. Land Use / Land Cover in the Big Sandy

Early History of the Big Sandy River Basin

McDowell County is the southernmost county in the state. Welch, located at the confluence of the Tug River and Elkhorn Creek, is the county seat. McDowell County was created in 1858 from part of Tazewell County, Virginia and named in honor of James McDowell, a former Virginia Governor. Essentially, the entire county is in the Big Sandy River Basin.

Mingo County was established in 1895 and is the youngest county in West Virginia. Mingo County was named after the Mingo tribe. The Mingo, Shawnee, Cherokee, and Delaware peoples lived, hunted, and had villages in what is now Mingo County. Taylors and Starrs were the first white settlers in about 1786. About two-thirds of Mingo County is in the Big Sandy Basin.

Wayne County is in the southwestern part of WV. Stephen Kelley settled at the mouth of the Big Sandy River in 1798. Wayne County was formed in 1842 and was named in honor of Anthony Wayne, a general in the Revolutionary War. The county seat changed names several times before becoming the present day Wayne. About one-third of the county is in the Big Sandy Watershed.

Due to the rugged terrain and lack of suitable land for settlement and agriculture, the Big Sandy Watershed remained largely unsettled until the coming of the railroad. The watershed has extensive timber and coal resources that could not be fully exploited until railroads reached the area in the 1880's. The Big Sandy Railroad began running in 1872 and the first train ran from Williamson, WV to Pike County, KY in 1880. Coal mining and timbering grew rapidly once transportation was established and continue to influence all aspects of the Big Sandy Watershed today.

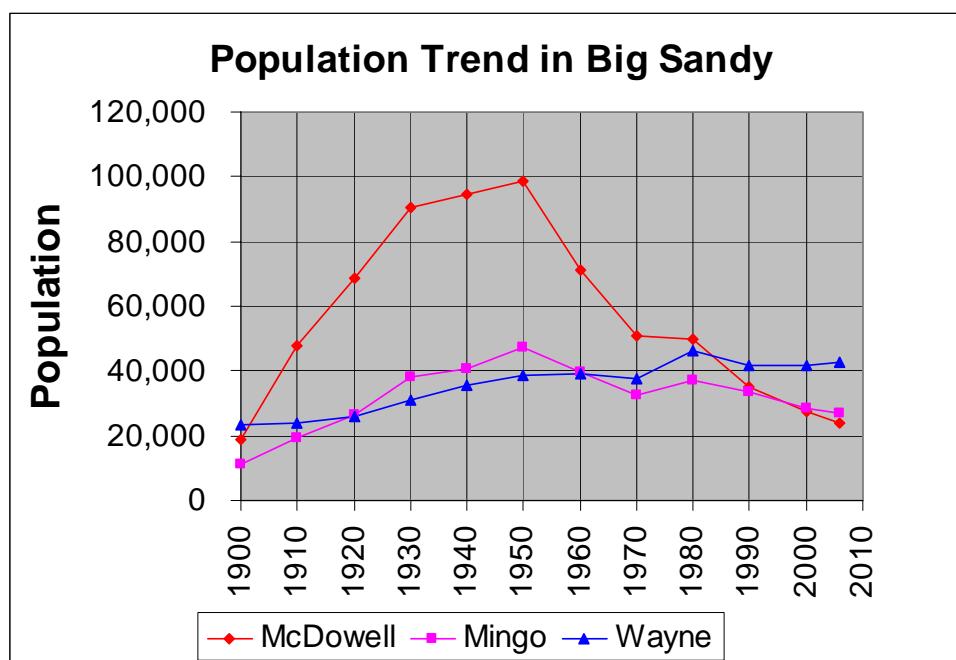
There were significant historical events in the watershed. The famous Hatfield-McCoy family feud took place in Mingo County and parts of eastern Kentucky. Mining in the region was a flashpoint for labor rights in the early 1900's. Matewan, Mingo County is well known as the site of a bloody confrontation between townspeople, miners and mine company detectives in 1920. After an argument, shots were fired leaving the mayor, seven detectives and two miners dead. Their deaths triggered many disturbances, including the armed march of miners through the southern coal fields, culminating in the showdown at Blair Mountain between miners, operators and federal forces.

Demographics

Population

Since 1950, the watershed has experienced population decline, especially in McDowell County where 76% of the residents have left. McDowell County was once among the ten most populated counties in WV. However, population rapidly declined when the coal industry began to mechanize, requiring less human labor. Given the lack of other employment opportunities, residents streamed from the area to find work elsewhere.

Figure 1. Population Trend in Watershed Counties



Wayne County is slightly more economically diverse and less isolated, resulting in a slightly increasing population. However, more of Wayne County's population is in the northern portion of the county, outside the Big Sandy Watershed. Population loss has strained the economic viability of the region and depleted the local tax base.

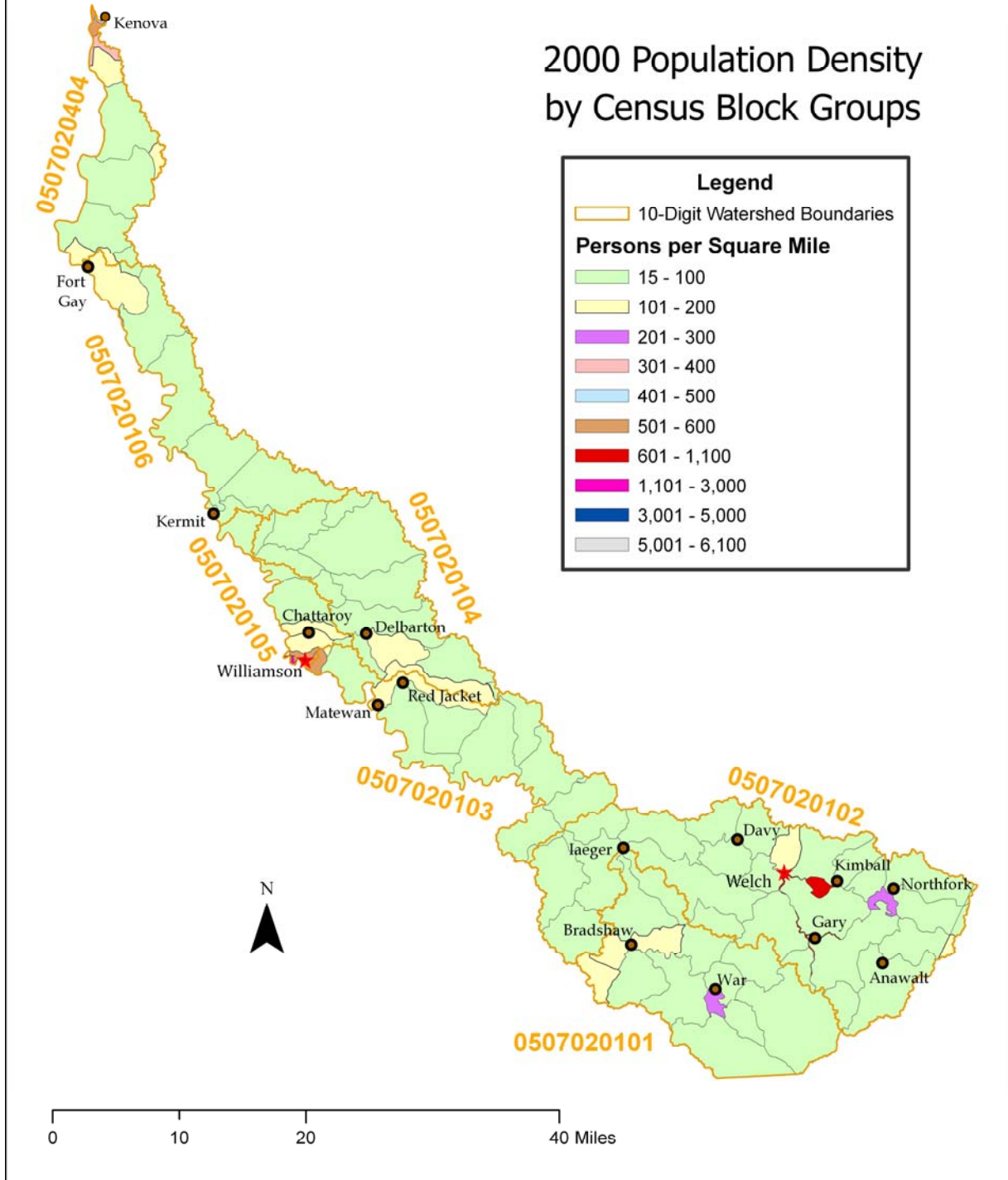
Settlement Patterns

Traditionally, communities were situated adjacent to coal mining operations to facilitate a readily available workforce. Early development was driven by discovery of coal and development of the railroad to service the industry, not because of the suitability of land to support people. Without coal, the area most likely would have had few residents.

Houses, roads, electricity, railroads and other community infrastructure were provided by mine operators on the only flat land available near the mines, which resulted in poor community planning. Drinking water was often a byproduct of the mining operation and

Big Sandy River Basin in West Virginia 10-Digit Watersheds

2000 Population Density
by Census Block Groups



Map 3. Population Density by Census Block Groups

furnished to residents by the mine. Domestic sewage and solid waste were disposed of into the streams and carried away, eventually reaching the Tug Fork and Big Sandy Rivers and waters beyond. As a consequence of this arrangement, all aspects of life were dependent upon the local mining operation. Once the mine was depleted, communities declined and residents moved out.

This settlement pattern remains today, with communities crowded into narrow pockets of land that are separated by steep, formidable mountains, and narrow, twisty roads. Although transportation has improved somewhat, communities remain isolated.

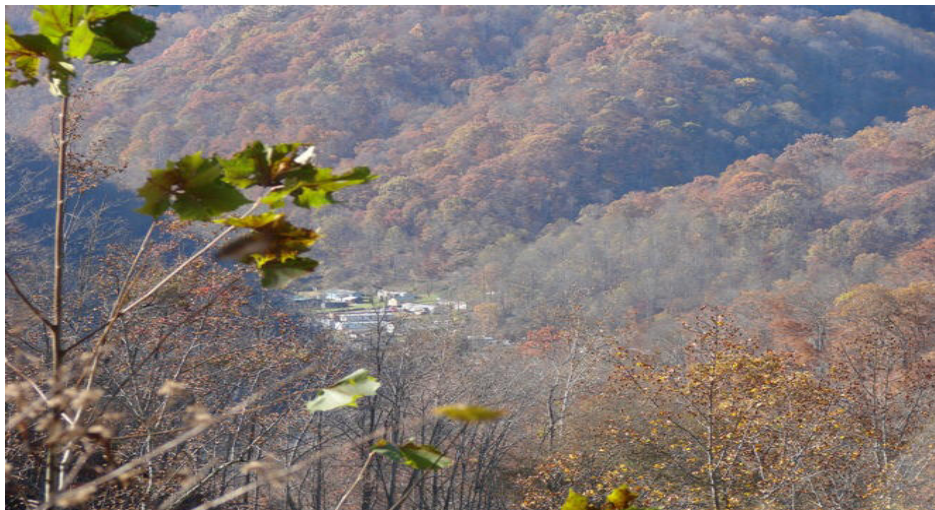


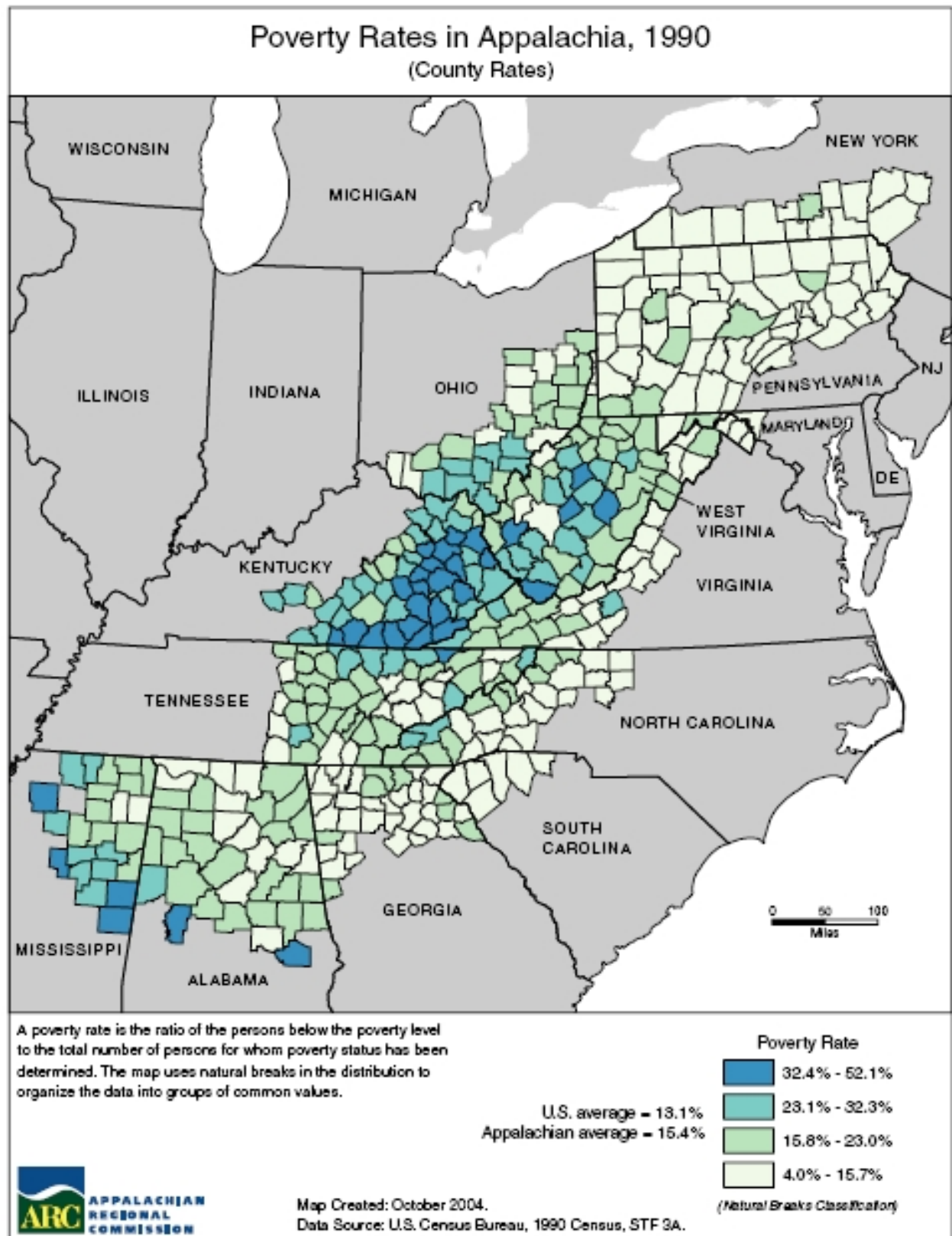
Photo 2. Settlement in the Big Sandy Watershed

Resident Profile

The following chart gives a general profile of watershed residents. Census 2000 data for all three counties was combined to represent the watershed. Statistics show that watershed residents tend to be older, less educated, have less income, and have higher disability rates than the state and nation. The watershed population has a high incidence of health problems, one of the highest rates of teen pregnancies, and the highest usage of smokeless tobacco in the state. McDowell and Mingo Counties are classified as “distressed counties” by the ARC.

Table 2. Resident Profile

Statistic	Watershed	WV	Nation
Percent White	94%	95%	80%
Median Household income	\$24,886	\$33,993	\$44,334
Households receiving public assistance	8%	4%	3%
Percent of persons below poverty	29%	18%	12%
Persons 65 years or older	15%	15%	12%
Persons with a bachelor’s degree or higher	8%	15%	24%
Persons with a disability	35%	23%	17%



Map 4. Poverty Rate in Appalachian Counties

Education

Trends in education in the watershed have mirrored the decline in population. There has been a decline in the number of schools and the student population, resulting in school consolidations. Williamson Community College in Mingo County is the only higher education entity in the watershed. There are several small community colleges and Marshall University within 100 miles of most residents in the watershed, but commuting is difficult due to poor roads. Test scores in the watershed lag behind state averages as well. A recent national study lists two high schools in the watershed as having very high dropout rates with less than 60 percent of students graduating.

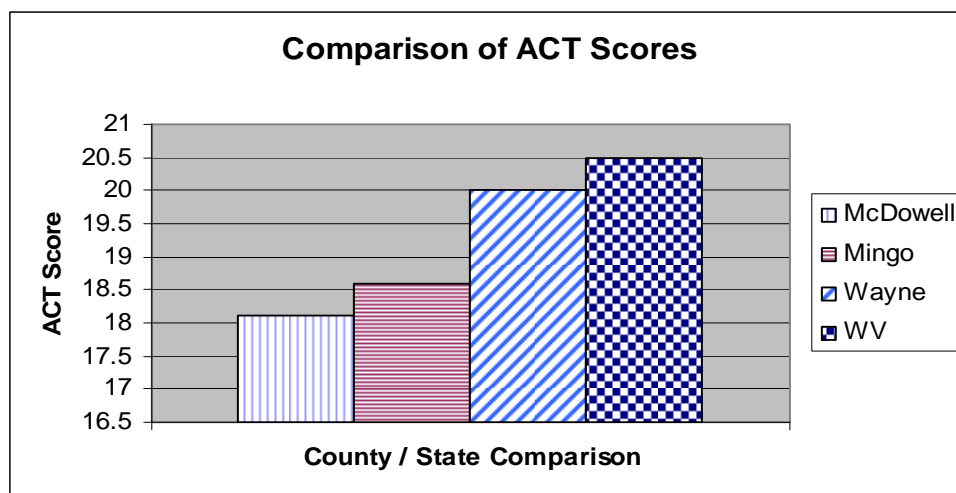


Figure 2. Comparison of Test Scores

Housing

The following chart gives a general profile of housing in the watershed compared to state and national standings. Statistics for McDowell County were used as a basis for comparison. Generally, homes in the watershed are older and of lower value, but home ownership rate is higher and homes tend to be mortgage free.

Table 3. Housing Characteristics in Year 2000

Statistic	McDowell County	WV	Nation
Homeownership rate	79%	75%	66%
Homes with a mortgage	23%	52%	70%
Median value of homes	\$22,600	\$72,800	\$119,600
Median rent per month	\$180	\$320	\$469
Percent vacancy	42%	26%	15%
Median year home constructed	1954	1969	1971
Percent of homes built before 1939	30%	19%	15%

The Local Economy

Employment and Wages

Income and other economic indicators are depressed relative to the state and nation. Even during the robust national economic period of the late 1990's conditions in the watershed were well below state and national norms. Statistics that describe the watershed economy and employment picture have improved due to out-migration of population and gradual economic diversification, but remain at dismal levels.

Employment in the watershed is concentrated in local government services (public education), natural resources and mining, and retail trade. In 2007, the unemployment rate in the watershed was 5.9% compared to a state and national rate of 4.6% and 4.5%, respectively. Average weekly wages are relatively high due to well-paying mining jobs.

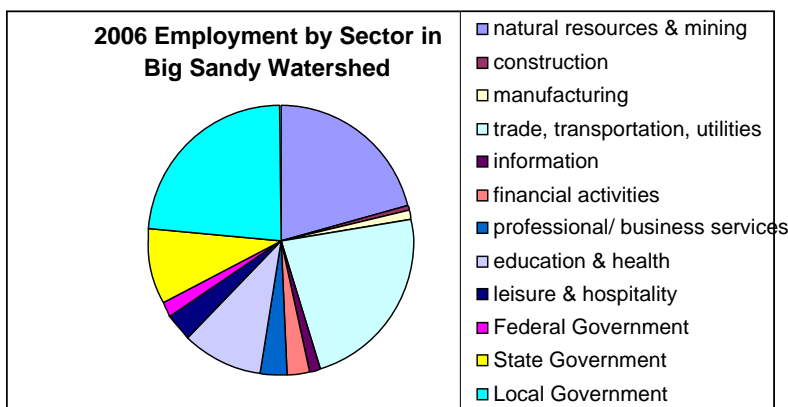
Table 4. Income Information

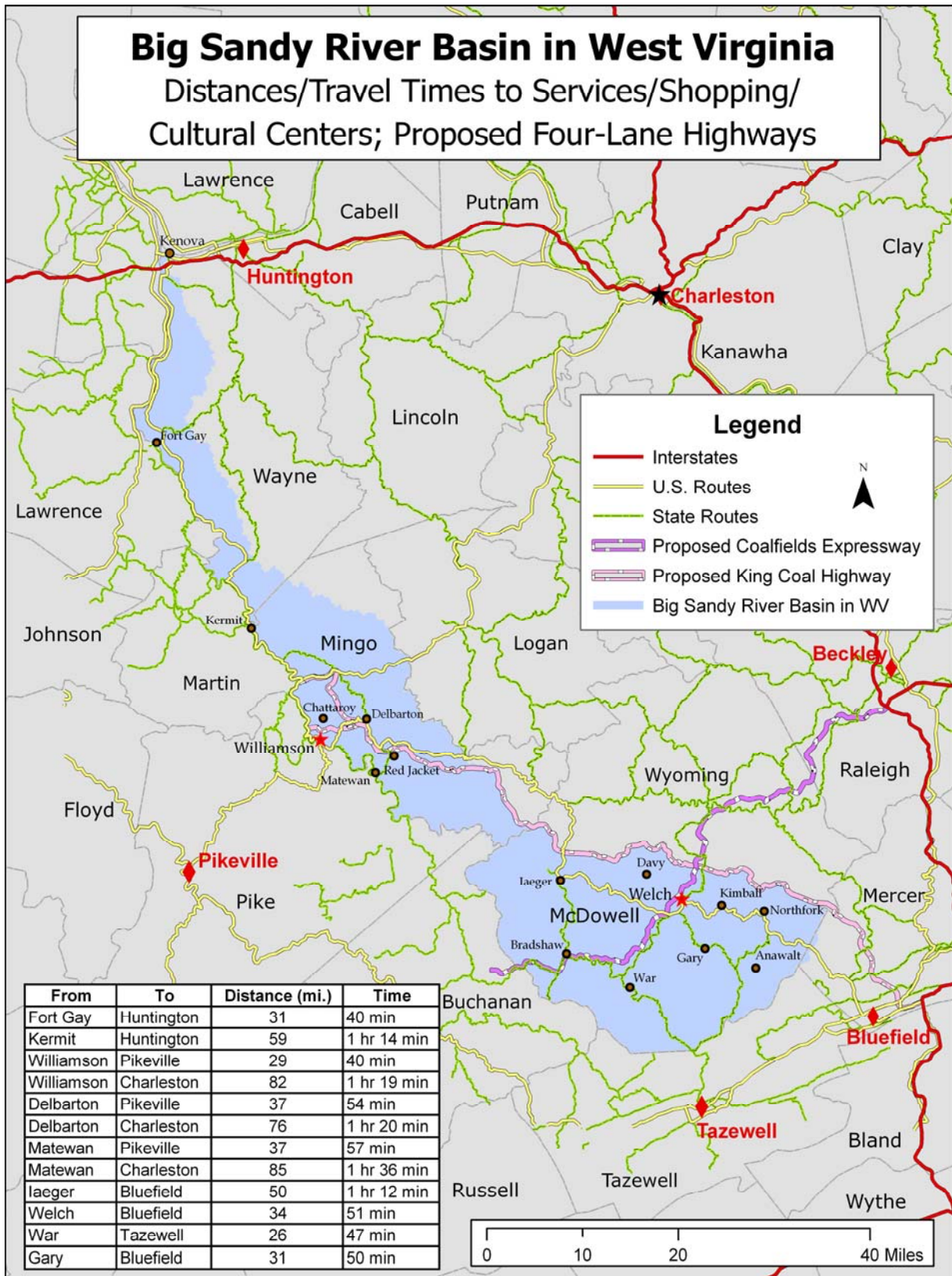
Statistic	Watershed	WV	Nation
Median household income (2000)	\$24,886	\$33,993	\$44,334
Unemployment rate (2007)	5.9%	4.6%	4.5%
Average weekly wage (2007)	\$659	\$623	\$581
Percent employed outside county of residence (2000)	42%	31%	27%

Economic Diversification

There is a lack of economic diversification in the Big Sandy Watershed, with most jobs concentrated in a few categories. The mining sector is volatile, depending on global energy trends. There is a lack of manufacturing, wholesale trade, professional services, local health services, and small businesses. Residents must travel to urban areas such as Huntington, Beckley, and Pikeville, KY to shop and obtain personal services. The lack of economic diversification hinders local community planning, local tax revenues, and neighborhood vitality.

Figure 3. Employment by Sector





Map 5. Travel Times to Nearest Urban Areas

Transportation

Transportation in the Big Sandy Watershed is difficult as a result of the steep topography. There are no interstate highways, no regional airports, no passenger train service, and no regional bus service. Public transportation is limited in McDowell and Wayne Counties and unavailable in Mingo County. All-terrain vehicles are a significant mode of travel for residents. Freight trains serve the coal fields, but do not provide passenger service.

Appalachian Highway System Corridor G, a four-lane limited access road from Charleston to Williamson, provides the best route north-south through the watershed. However, there are substantial travel times for most residents to access Corridor G. US Routes 52, 60, and 119 and State routes 16, 65 and 103 are two-lane, paved, narrow roads that include a high percentage of "No Passing" zones, steep grades and areas of reduced speeds through many locations. Coal truck traffic is common on all roads.

Highway construction in this region is challenging due to the topography. There have been significant upgrades to the highways in the Kentucky and Virginia portions of the Big Sandy River Basin, but West Virginia has not made as much progress. Two highways are planned for the region; however, little or no construction has occurred on these routes. The Coalfields Expressway will link Interstates 77 and 64 near Beckley to Virginia Route 83 at Slate, VA. The Expressway will generally follow Route 16 through Raleigh and Wyoming counties and West Virginia Route 83 in McDowell County.

The King Coal Highway is planned as a four-lane limited access route crossing portions of McDowell and Mingo Counties to connect to Interstate 77 at Bluefield and Interstate 64 at Kenova.



Photo 3. Construction on the Coalfields Expressway

Recreational

The remote nature of the watershed makes it attractive to outdoor recreational enthusiasts. There are several day-use facilities in the region, but there is a lack of overnight lodging facilities. Hotels, campgrounds, cabins, bed & breakfasts, restaurants, and other tourism-oriented services are sparse in the watershed. The development of the Hatfield-McCoy Trail has encouraged communities to provide more local amenities in an effort to capture tourist dollars.

Attractions include one public golf course in McDowell County and one in Mingo County. Wayne County has 2 public golf courses. Each county in the watershed has a small museum. There are no semi/professional sports teams, civic/convention centers or amusement parks in the watershed.



Photo 4. Twisted Gun Golf Course on a Former Mountaintop Removal Site

Table 5. Existing Recreation

HUC Name	Counties	WV Wildlife Management Areas	State Forests	Acres available for hunting in WV WMAs and State Forests	Boat Launches/ Public Fishing Access; Golf Courses	Miles of Day Hike Trails*	Miles of ATV/Dirt Bike Trails*
Dry Fork 507020101	McDowell	Berwind Lake WMA (18,000 acres hunting, 20 acres fishing, 8 primitive campsites)		18,000	Berwind Lake	---	
Elkhorn Creek-Tug Fork 507020102	McDowell	Anawalt Lake WMA (1,792 acres hunting, 7 acres fishing - stocked with trout, no camping) Tug Fork WMA (2,308 acres hunting, fishing in the Tug Fork River, no camping)	Panther (7,810 acres hunting, fishing in Panther Creek - stocked with trout, 6 tent/trailer campsites, pool)	11,910	Anawalt Lake, Black Wolf Public Golf Course at Gary	8.3	Approx. 75
Pond Creek-Tug Fork 507020103	McDowell, Mingo				Hatfield Bottom Roadside Park - Tug Fork River, Twisted Gun Public Golf Course at Wharnccliffe	---	**
Pigeon Creek 507020104	Mingo	Laurel Lake WMA (12,856 acres hunting, 29 acres fishing - fishing for channel catfish, largemouth bass and bluegill, catchable-sized trout are stocked, no camping)		12,856	Laurel Lake	1.5	**
Wolf Creek-Tug Fork 507020105	Mingo				Maher - Tug Fork River	1.3	**
Rockcastle Creek-Tug Fork 507020106	Mingo, Wayne		Cabwaylingo (only 128 acres in watershed, 8,123 total acres small game hunting, fishing in West Fork of Twelvepole Creek - stocked with trout, 14 cabins and 21 campsites, pool)	128 (8,123)		11.5 (In Cabwaylingo State Forest)	
Whites Creek-Big Sandy River 507020404	Wayne				Virginia Point Park - Big Sandy River	---	

* WV State Trails Program data; ** A total of 95 miles of ATV/Dirt Bike trails (the Hatfield-McCoy Recreational Area) are in these three watersheds

Wildlife and Fishery Resources

Wildlife species in the watershed are predominantly comprised of species that utilize woodland habitats. Areas of grasses and shrubs on reclaimed surface mines provide openings and important edge habitat in this forested watershed.

Common game species in the watershed include gray squirrels, whitetail deer, wild turkeys, and a growing number of black bears. Wild boar, introduced in the early 1970s, have become established in portions of southern West Virginia and may occur in certain parts of the watershed. Furbearers in the county mainly include the gray fox, raccoon, striped skunk and a few bobcats.

There are few cold-water streams that can support trout. Due to deep mine discharges of cold water, Elkhorn Creek and Jacobs Fork support populations of rainbow trout and brown trout. Most of the other streams in the county are limited by their size and by pollution and cannot sustain significant warm-water fisheries.

The watershed provides important woodland habitat for neotropical migrant songbird species. Large forested tracts are particularly important habitat for woodland warbler species. Songbird species dependent upon non-forest and edge habitats are found on reclaimed surface mine sites. The watershed also sustains a variety of reptile and amphibian species.

There are no federally listed threatened or endangered species in the watershed except for the endangered Indiana Bat. This species may utilize abandoned mine portals in the area or occupy summer habitat within the watershed. No federally listed aquatic species are known to inhabit the West Virginia portion of the Big Sandy River Basin.



Photo 5. WV State Animal - Black Bear

Coal Mining in the Big Sandy River Basin

In 1886, the Norfolk and Western railroad announced an east-west line through southern West Virginia. In February 1889, the decision was made to route the line through the Tug Fork River Valley. The Williamson Coalfield, comprised of Mingo and parts of McDowell and Wayne counties, was opened shortly after the completion of the N&W mainline along the Tug Fork. From 1890-1910, coal production in the southern counties expanded by over 300% and by 1925, over 2/3 of the coal produced in the state came from southern West Virginia.



Photo 6. Coal Preparation Plant in Southern WV

Coal reserves in the Big Sandy have been extensively mined for over a hundred years and mining continues to dominate the economic, environmental and cultural aspects of the region. McDowell County has produced more coal than any other county in West Virginia. For perspective on the importance of coal mining to the Big Sandy and to the state and nation, West Virginia produces about 15 % of total coal mined in the US and the state leads the nation in underground coal production. West Virginia also leads the nation in coal exports with over 50 million tons shipped to 23 countries, accounting for about 50% of US coal exports. A number of coal seams have been extensively surface mined and deep mined in the watershed including the Cambell Creek (No. 2 Gas), Eagle, Lower War Eagle, Gilbert, Iaeger, Sewell, Beckley, Fire Creek, and the Pocahontas No. 3, 4, 6, and 9 seams. There are approximately 30 commercially mineable coal seams in the basin.

There has been continuous mining in the basin since the completion of the Norfolk and Western Railroad in the late 1800s. From 1883 to 1974 total coal production was

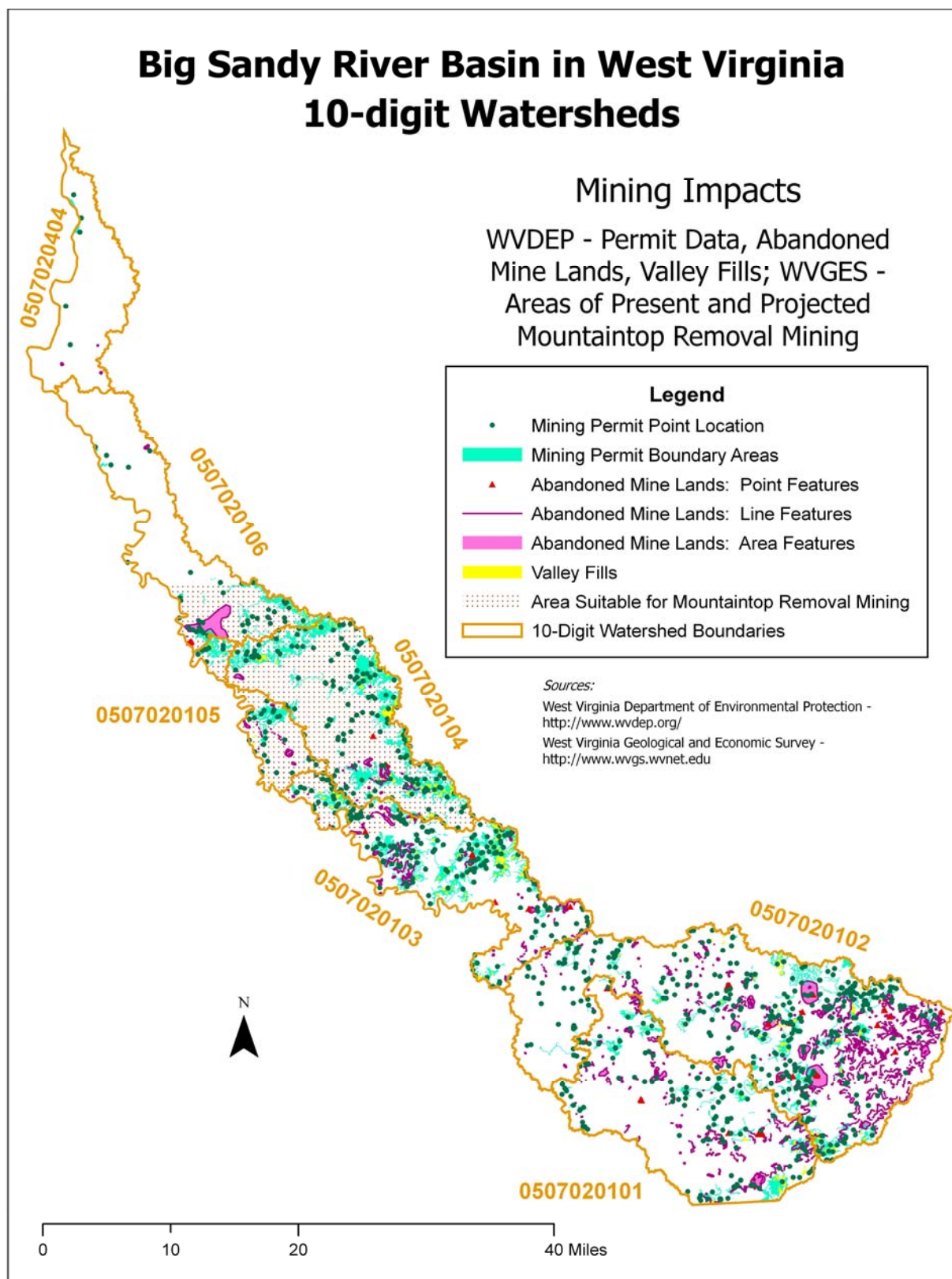
approximately 1.6 billion tons. In the 1970s, approximately 90 percent of the coal was produced from underground mines and the remaining 10 percent came from surface mining. Surface mining activities have significantly increased since then, accounting for approximately 19 percent of total production during the 1980s, and 31 percent in 1997 (WVGES, 1998). The increase in surface mining is due to the increased demand for production of low sulfur coal.

The southern portion of the Tug Fork basin is well-known for large deposits of high quality metallurgical coal. Metallurgical coal has a particularly high BTU, but low ash content and is used to make coke for steel manufacture.



Photo 7. Coal Trains in Mingo County

Large mountaintop removal mining operations have contributed to the recent increase in surface-mined coal in the region. Mountaintop removal mining operations are large-scale surface mines in which rock layers are systematically removed starting from the top of mountain ridges to uncover the underlying coal beds (WVGES, 1998). Mountaintop removal operations boosted coal production in West Virginia to record levels in 1997 (WVGES, 1998).



Map 6. Mining Impacts in the WV Big Sandy Basin



Photo 8. Mountaintop Removal Site in Southern WV

Table 6. Coal Production in 2007

Coal Production of WV Big Sandy Counties	Underground Production (tons)	Surface Production (tons)	Total Production (tons)
McDowell	5,953,445	2,907,993	8,861,438
Mingo	12,085,029	6,471,932	18,556,961
Wayne	4,719,102	1,095,830	5,814,932



Photo 9. Coal House Chamber of Commerce in Williamson

Forestry in the Basin

Forestry is another major industry in the Big Sandy Watershed. Woodland tracts range from small woodlots to corporate-owned forests consisting of several thousand acres. Panther Creek State Forest is the largest parcel of government-owned forest land in the watershed. Although the watershed is rich in forest resources, there are few value-added facilities located in the region.

Table 7. Wood Processing Facilities

	McDowell	Mingo	Wayne
Concentration Yards	0	0	1
Consumer Products	0	1 (Justice)	0
Dry Kilns	1 (Roderfield)	0	1 (Kenova)
Engineered Wood Products	0	0	0
Green Lumber (lumber that hasn't undergone a formal drying process)	0	7 (Delbarton, Gilbert, Varney, Kermit)	1 (Fort Gay)
Producers of Fire Wood	0	0	0
Rustic Products	0	0	0
Treatment Plants	0	0	0
Veneer	0	0	0

According to the U.S. Forest Service Forest Inventory and Analysis Database Retrieval System, there are more than 3,800 square miles of forest land (approximately 2.4 million acres) in the 13 counties in and around the Big Sandy Basin (West Virginia, Kentucky, and Virginia). Table 8 shows the estimated area of forested land (in square miles) for the counties in the WV portion of the Big Sandy basin.

Table 8. Land in Forests and Timberland

County	All Land (sq.mi.)	Total Forest (percent)	Non-Forest Land (percent)
McDowell	342.4	91%	9 %
Mingo	271.3	87%	13%
Wayne	323.8	85%	15%

The relative value of the forest resources in the Big Sandy are low compared to the rest of WV. McDowell, Mingo and Wayne Counties are included in Region 5 and have the lowest stumpage prices of all regions across the state. Average stumpage prices for WV in 2007 were \$247.99 compared to \$199.09 for Region 5, which includes the Big Sandy Watershed.

Resource Concerns

Resource concerns in the Big Sandy have been identified by state agencies, watershed groups, conservation districts, and other stakeholders. Resource problems are exacerbated by the extreme topography, large-tract absentee land ownership, settlement patterns, and long-term resource extraction in the region. Resource concerns include:

- **Economic Viability of Forest Industry**
- **Floodplain Use and Flooding**
- **Mining Impacts**
- **Recreation**
- **Water Quality**

Economic Viability of the Forest Industry

The single largest problem affecting forest productivity and quality in the Big Sandy River Basin is recurrent forest fires. When leaf litter and understory burn, trees are damaged at all growth stages. Some fire-damaged trees die within a relatively short time. Most fire-damaged trees, however, are wounded, and whole stands are rendered worthless due to the onset of disease and the subsequent decline in quality and productivity. In addition, once leaf litter is burned off the very steep slopes, which occurs throughout most of the watershed, erosion is commonly very severe. As a result, site productivity declines even more and water quality is degraded due to sedimentation. Thus, forest fires commonly affect forest, soil, and water resources in the watershed for many years after they occur.

Forest fires are a resource concern in the Big Sandy. The watershed is split between two forest districts, but data shows that 93% of the acreage burned in West Virginia in 2007 was in southern WV. The majority of forest fires start as a result of debris burning. Other leading causes include equipment use and arson.

Many reclaimed surface mines and mine spoil areas have been planted to white pines and other species. Most of these stands of trees are relatively young and not of economic significance at present.

Flooding and Floodplain Use

Flooding is a frequent and recurrent problem in much of West Virginia. In 2001, and again in 2002, a series of intense thunderstorms crossed southern West Virginia, causing devastating flooding. In addition to millions of dollars in property damages and emergency costs, several lives were lost in the floods. Despite the many flood protection programs available through federal and state agencies and the many existing flood protection projects, flooding continues to be West Virginia's most common and widespread natural disaster.

The topography and settlement patterns in the Big Sandy Watershed make the area particularly susceptible to devastating flooding. Floodplains are narrow and channel capacity is further limited by encroachment of roads, utilities, and homes. Communities are concentrated in the valleys on the only flat land available. Advance warning of flood events is ineffective due to the rapid runoff from mountains. Lead time to react to impending flooding is often only minutes, resulting in extensive losses in property and human health and safety concerns.

The US Army Corps of Engineers has invested millions of dollars in floodwalls, property modifications, and relocations throughout the region. Williamson and Matewan both have multi-million dollar floodwalls surrounding them. Other federal, state, and local projects have attempted to alleviate the flooding, but it remains a persistent and devastating problem for the Big Sandy Watershed.



Photo 10. Floodwall in Matewan, Mingo County

The following table gives a snapshot of damages incurred in the 2001 and 2002 floods in McDowell County. Other areas of the Big Sandy Basin in Mingo and Wayne Counties were similarly impacted by severe flooding. The dollar amounts do not fully capture the total damage to residential and business property or structure contents. They also do not include massive infrastructure damages and losses to utilities, lost work time, and dollars spent by individuals, faith-based organizations and charities after the floods. These

numbers do not account for expenditures by railways to repair and replace infrastructure and freight damaged by the floods.

Table 9. 2001-2002 Flood Damages in McDowell County

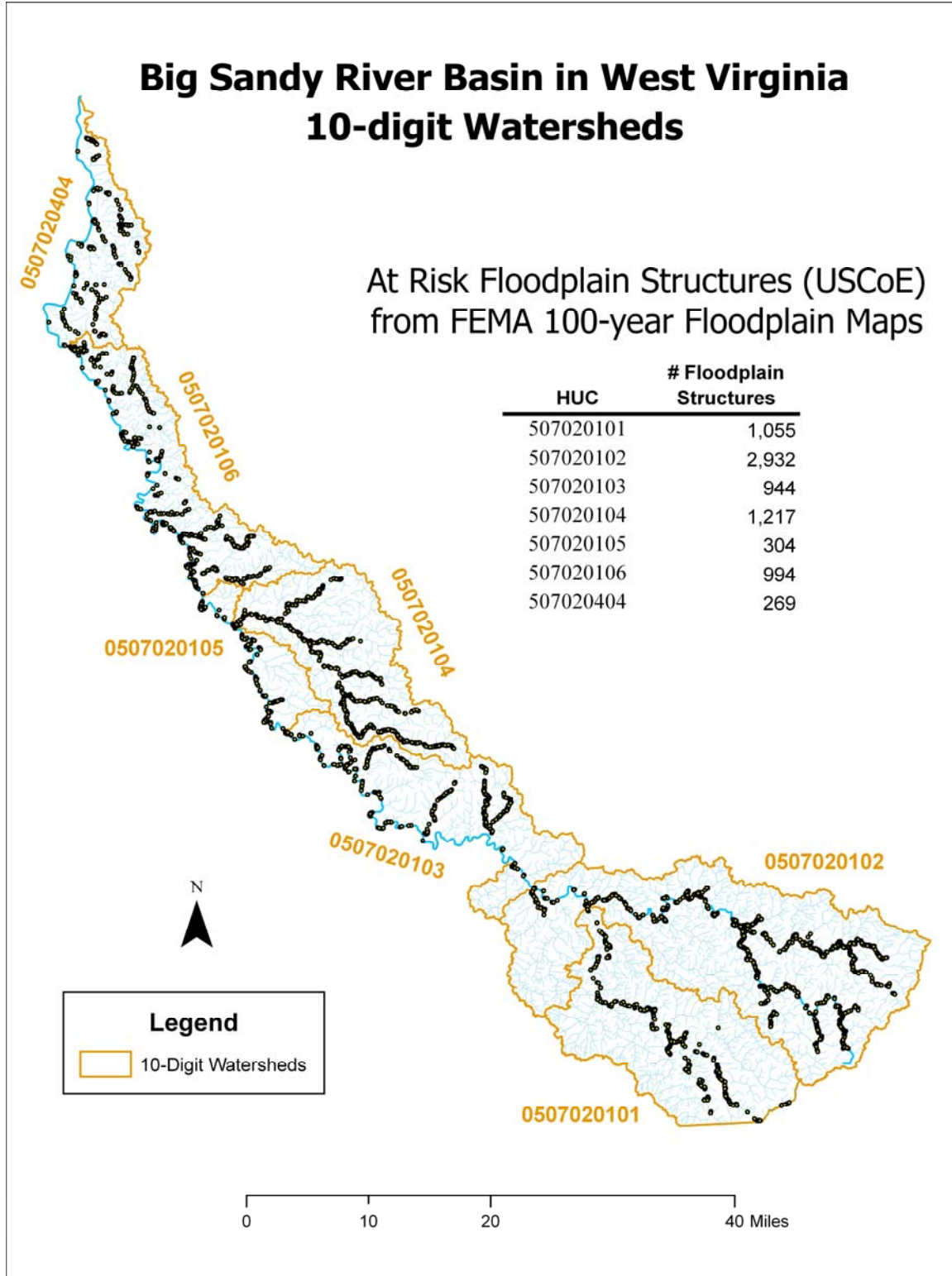
	2001	2002
Number of Homes Affected	2,972	4,738
Dollar Damages	\$12,000,000	\$54,000,000

FEMA estimates there are 7,700 structures and associated infrastructure at risk for flooding in the region. This is a conservative estimate considering that floodplain mapping is limited to larger order streams and is not generally available on small tributaries.



Photo 11. Flooding in Southern WV

NRCS has constructed hundreds of flood reduction structures throughout the state. However, there are none in the Big Sandy Watershed. The topography of the region makes it very difficult to find effective flood control dam sites. Costs are prohibitive due to the extreme slopes and benefits are too localized to meet the cost/benefit requirements of PL566 watershed projects. Obstacles such as large tracts of land held by absentee owners, extensive underground mining, and locations of railroads and other transportation corridors can be insurmountable from a project planning perspective. There has been reluctance by NRCS to promote non-structural flood damage reduction measures such as community relocation and improved floodplain planning. There is great potential for community relocation and floodplain planning assistance in the basin.



Map 7. At-Risk Structures Identified by FEMA Mapping

Water Quality

There are no streams or rivers in the watershed that have special protective federal or state status. Many streams are impaired as indicated by routine sampling by state agencies and local watershed groups. West Virginia's 2006 Section 303(d) list of impaired streams lists 30 waterbodies in the Tug Fork and Big Sandy Watersheds because of biological, fecal coliform, or metals impairments. A total of 263 miles of streams are impaired. Fecal coliform is the single biggest stream degradation issue in the Big Sandy Watershed.

Sources of impairment include sewage, mine drainage, stream sediment and turbidity, routine dredging and channelization, impaired riparian areas, active mining practices such as valley fills, and abandoned coal refuse piles. Streams are also encroached upon by buildings, highways, and utilities. The McDowell County Wastewater Coalition estimates that 67% of all households do not have adequate wastewater treatment.

“The adoption of indoor plumbing through the mid-1900’s eliminated the need for out-door privies and provided convenience. Direct discharge of waste into streams became common and wasn’t considered a problem until the effluent in the creeks made people think twice about swimming and fishing. This straight-pipe scenario was common not only in McDowell County but throughout the Ohio River Basin. Not until the 1950s were regional efforts begun to construct wastewater treatment plants and eliminate straight pipes. The Gary municipal treatment plant constructed by U.S. Steel at Wilcoe, WV is the only example of this regional trend in McDowell County. It wasn’t until the 1990s that additional treatment plants were constructed in the county.” McDowell County Wastewater Coalition January 2007



Photo 12. Straight Pipe Discharge in McDowell County

Table 10. West Virginia 2006 Section 303(d) List for the Tug Fork and Big Sandy

Stream Name	Code	Criteria Affected	Source	Impaired Size (miles)	Reach Description
Tug Fork River	WVBST	CNA-Biological	Unknown	103.4	RM 51.6 to HW
		Fecal Coliform	Unknown	35.7	Mouth to RM 35.7
Lost Creek	WVBST-7	CNA-Biological	Unknown	4.5	Entire length
Silver Creek	WVBST-16	CNA-Biological	Unknown	2.5	Entire length
Sulphur Creek	WVBST-41	CNA-Biological	Unknown	1.7	Entire length
Bull Creek	WVBST-57	Fecal Coliform	Unknown	4.9	Entire length
Left Fork/Bull Creek	WVBST-57-B	Fecal Coliform	Unknown	2	Entire length
Greenbrier Fork	WVBST-60-A	CNA-Biological	Unknown	3.5	Entire length
Horse Creek	WVBST-63	CNA-Biological	Unknown	4.6	Entire length
Grapevine Branch	WVBST-70-F	CNA-Biological	Unknown	1.8	Entire length
Wolfpen Branch	WVBST-70-M-3	CNA-Biological	Unknown	1.6	Entire length
Jacobs Fork	WVBST-70-W	Fecal Coliform	Unknown	10.6	Entire length
Mountain Fork	WVBST-70-W-1-A	CNA-Biological	Unknown	3.6	Entire length
Badway Branch	WVBST-78-G	CNA-Biological	Unknown	1.3	Entire length
Upper Shannon Branch	WVBST-95	CNA-Biological	Unknown	2.4	Entire length
North Fork/Elkhorn Creek	WVBST-99-L	Fecal Coliform	Unknown	8	Entire length
Windmill Gap Branch	WVBST-99-L-4	Fecal Coliform	Unknown	2.8	Entire length
Rock Narrows Branch	WVBST-103	CNA-Biological	Unknown	1.7	Entire length
Little Creek	WVBST-120	Fecal Coliform	Unknown	4.2	Entire length
Big Sandy River	WVBS	Iron	Unknown	26.6	Entire length
Miller Creek	WVBS-1	CNA-Biological	Unknown	1.7	Entire length
Cedar Run	WVBS-4	CNA-Biological	Unknown	1.1	RM 0.4 to HW (RM 1.5)
Whites Creek	WVBS-5	CNA-Biological	Unknown	8.8	Entire length
Balangee Branch	WVBS-5-A.9	CNA-Biological	Unknown	1.6	Entire length
Gragston Creek	WVBS-6	CNA-Biological	Unknown	6.5	Entire length
Elijah Creek	WVBS-7	CNA-Biological	Unknown	2.2	Entire length
Gilkerson Branch	WVBS-7-B	CNA-Biological	Unknown	1.2	Entire length
Hurricane Creek	WVBS-8	CNA-Biological	Unknown	7.9	Entire length
Sugar Branch	WVBS-8-0.7A	CNA-Biological	Unknown	0.8	Entire length
Tabor Creek	WVBS-10	CNA-Biological	Unknown	2.6	RM 1.0 to HW
Redhead Branch	WVBS-13	CNA-Biological	Unknown	0.7	Entire length

(CNA – Conditions Not Allowable)

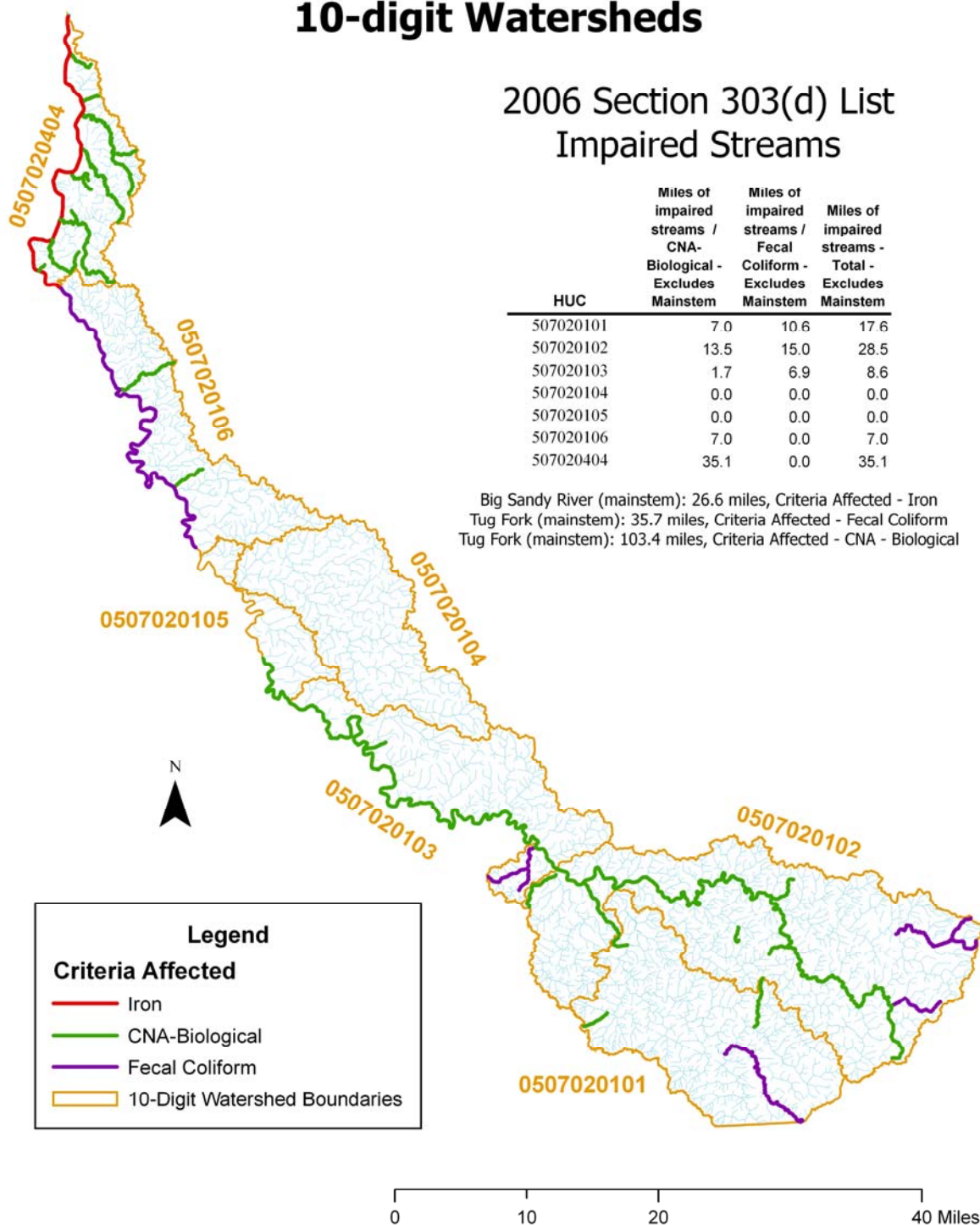
NRCS has provided planning assistance with this monumental resource issue through RC&D projects. However, there has been a reluctance to address water quality impacts caused by *human domestic sewage* using traditional Farm Bill programs and conservation technical assistance. Although the PL566 Watershed Program includes a mission to address water quality, the agency has traditionally focused watershed resources on large flood projects rather than small water quality projects.

Big Sandy River Basin in West Virginia 10-digit Watersheds

2006 Section 303(d) List Impaired Streams

HUC	Miles of impaired streams / CNA- Biological - Excludes Mainstem	Miles of impaired streams / Fecal Coliform - Excludes Mainstem	Miles of impaired streams - Total - Excludes Mainstem
507020101	7.0	10.6	17.6
507020102	13.5	15.0	28.5
507020103	1.7	6.9	8.6
507020104	0.0	0.0	0.0
507020105	0.0	0.0	0.0
507020106	7.0	0.0	7.0
507020404	35.1	0.0	35.1

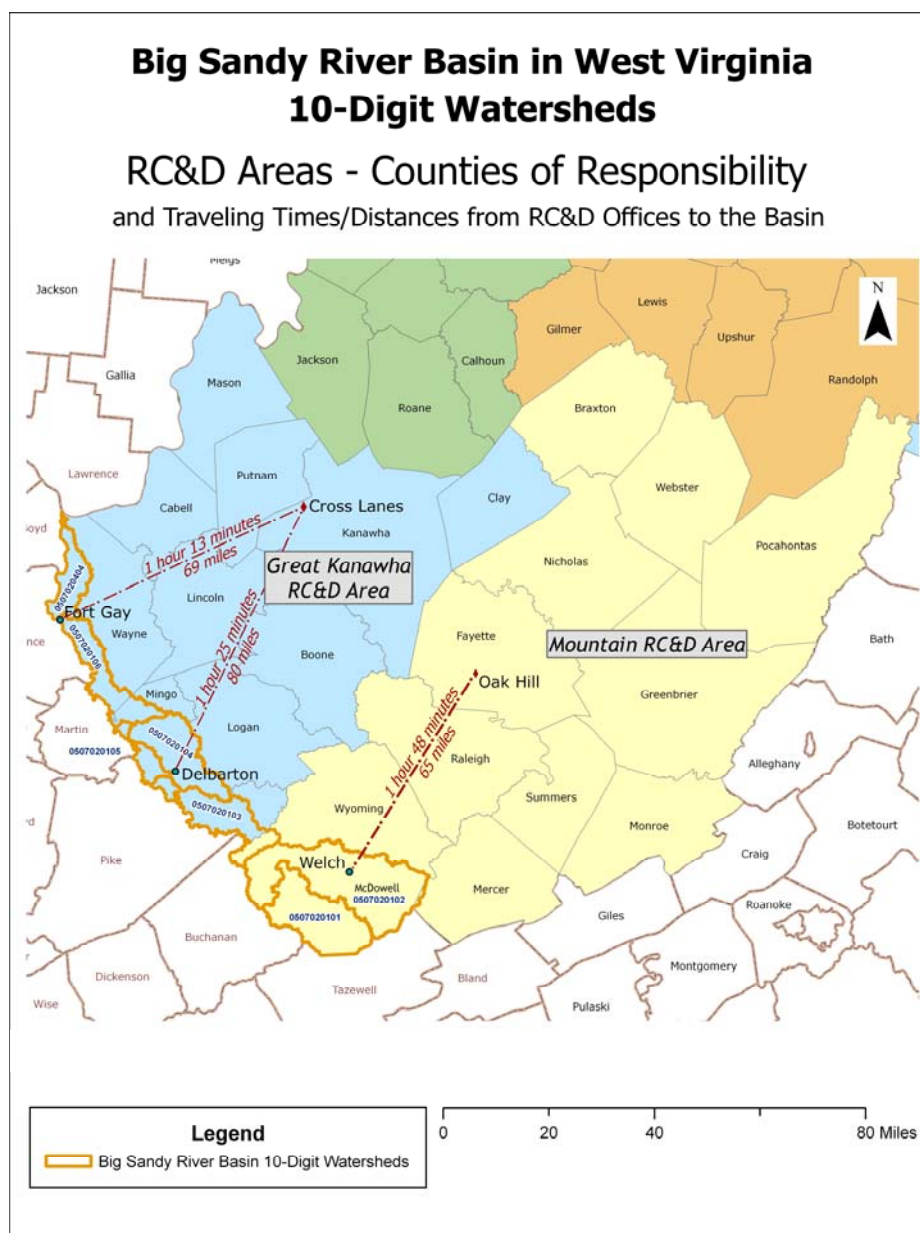
Big Sandy River (mainstem): 26.6 miles, Criteria Affected - Iron
 Tug Fork (mainstem): 35.7 miles, Criteria Affected - Fecal Coliform
 Tug Fork (mainstem): 103.4 miles, Criteria Affected - CNA - Biological



Map 8. Impaired Streams in Big Sandy Watershed

Recreation

The need to diversify local economies has increased awareness of the tourism potential in the Big Sandy Watershed. However, accessibility to the area is a major obstacle. Additionally, the lack of local tourist amenities and the degraded natural environment are counter-productive to attracting tourists. Recreation best fits the mission of RC&D, but it is also available through other NRCS programs such as the PL566 Watersheds program. There are two NRCS RC&D Coordinators that assist McDowell, Mingo and Wayne Counties, but they cover many other counties as well. Due to the difficulty in traversing the region, there is not sufficient staff to concentrate in the Big Sandy Basin.



Map 9. RC&D Offices and Travel Times to the Big Sandy Watershed

Mining Impacts

Table 11. Abandoned Mine Land Resource Problems

Problem	McDowell	Mingo	Wayne	Total
Refuse Pile- Embankment (acres)	476	117	14	607
Highwalls (acres)	7,318	1,088	4	8,410
Water Related (acres)	1,503	0	0	1,503
Burning (acres)	31	21	0	52
Hazardous Facilities (acres)	11	5	0	16
Portals, Pits, Shafts	199	112	79	390
Other Related Problems (acres)	291	0	6	297

There is an estimated \$120 million dollars of needed abandoned mine reclamation work remaining in the West Virginia portion of the Big Sandy River Basin. Programs such as RAMP have been used to address abandoned mine impacts in the Big Sandy, but funding has not been available in that program for several years. Stream restoration can be achieved under programs such as WHIP and EQIP, but funds and technical assistance for those programs have been traditionally targeted to agricultural areas.

Impediments to Resource Improvement

To date, NRCS has been relatively ineffective in addressing resource concerns in the Big Sandy Watershed. There are several impediments, both external and internal, to building NRCS success in the region.

NRCS impediments:

- There has been philosophical and programmatic reluctance on the part of NRCS to seek innovative projects in the region.
- NRCS programs that best meet the needs of the region are unavailable or very limited. The bulk of funding for NRCS Farm Bill programs is focused on agricultural operator's needs and there are very few farmers in the region.
- Potential customers in the basin are not familiar with NRCS programs.

External impediments:

- Economic and social issues in the region take precedence over natural resource concerns.
- The legacy of resource extraction in the watershed has not fostered a conservation stewardship ethic.
- Travel to and within the watershed requires a substantial time commitment.

Table 12. NRCS Program Activity in the Big Sandy Watershed

	Dry Fork	Elkhorn Creek	Pond Creek	Pigeon Creek	Wolf Creek	Rockcastle Creek	Whites Creek
	0507020101	0507020102	0507020103	0507020104	0507020105	0507020106	0507020404
Soil Surveys	3	3	5	2	2	4	2
EQIP	None	2	None	None	None	2	23
WRP	None	None	None	None	None	None	None
WHIP	None	1	None	2	None	None	None
FRPP	None	None	None	None	None	None	None
FIP	None	None	None	None	None	None	None
RC&D	15	20	12	6	2	7	5
RAMP	3	4	None	None	None	None	5
Watersheds Survey & Planning	McDowell County Water Resources Study 1995	McDowell County Water Resources Study 1995; Panther Creek Feasibility Study 1991	McDowell County Water Resources Study 1995	Pigeon Creek Watershed Assoc. Plan 2001	None	None	None
PL566 Watersheds	None	None	Deauthorized project on Mate Creek	None	None	None	None
EWP *	8	45	None	2	None	None	1
AMA	None	None	None	None	None	None	None
CSP	None	None	None	None	None	1	None
CREP	None	None	None	None	None	None	None
CRP	None	None	None	None	None	None	None
GRP	None	None	None	None	None	None	None

*EWP does not include 281,424 feet of obstruction removal and 101 acres of seeding

Assessment Matrix

The resource concerns, potential NRCS programmatic match, and potential partners are shown in the assessment matrix.

Table 13. Assessment Matrix

Resource Concern	Applicable NRCS program	Does NRCS have the expertise	Potential Partners
Economic Viability of Forest Industry	WHIP, EQIP, RC&D	Yes	WVDOF, USFS, Watershed Groups
Floodplain Use and Flooding	PL566 Watersheds, RC&D	Yes	USACE, WVCA, Districts, Watershed Groups, Local Governments
Mining Impacts	PL566 Watersheds, RC&D, EQIP, WHIP	Yes, but limited in mine reclamation	OSM, WVDEP-AML, Watershed Groups, Local Governments
Recreation	PL566 Watersheds, RC&D, WHIP	Yes	WV Div. Tourism, Watershed Groups, Local Governments
Water Quality	PL 566 Watersheds, WHIP, EQIP, RC&D	Yes, but limited in domestic sewage treatment expertise	USACE, OSM, WVCA, WVDEP-AML, Districts, Watershed Groups, Local Governments, WV Dept. of Health, McDowell County Wastewater Coalition, Elkhorn Creek Watershed Association, Canaan Valley Institute

Evaluation of Rapid Watershed Assessment Approach

This Rapid Watershed Assessment approach to watershed planning has several positives and negatives.

Positives:

- This rapid watershed assessment allowed NRCS-WV to focus on a neglected area.
- There is greater awareness of what GIS layers are available for planning.
- The RWA provided an opportunity for an introspective view of NRCS.
- A variety of specialists participated in the planning effort.
- The RWA facilitated multi-state discussions regarding the Big Sandy.

Negatives:

- The findings of an RWA can be influenced by what GIS layers are selected.
- Some GIS layers do not exist or are not readily available.
- The RWA format does not fit well in nonagricultural watersheds.

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NRCS Soil Survey Mingo County: Web Soil Survey (most current data)

*An updated soil survey for Logan and Mingo Counties will be available later this calendar year.

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